WHAT IS CLAIMED IS:

1. A microscope for CARS microscopy comprising: means for generating a pump light beam and a Stokes light beam that can be directed coaxially through a microscope optical system onto a sample, wherein the means for generating the pump light beam and the Stokes light beam encompass a laser and a microstructured optical element that spectrally broadens the light of the laser and a detector for detecting the detection light proceeding from the sample.

2. The microscope as defined in Claim 1, wherein the laser is a pulsed laser.

3. The microscope as defined in Claim 1 further comprising: means for selection of the pump light beam and/or the Stokes light beam out of the spectrally broadened light.

4. The microscope as defined in Claim 3, wherein the means for selection contain an acoustooptical component.

5. The microscope as defined in Claim 3, wherein the means for selection directs the pump light beam and the Stokes light beam to the sample, and directs detection light proceeding from the sample to the detector.

6. The microscope as defined in Claim 3, wherein the means for selection is adjustable in such a way that pump light beams and/or Stokes light beams of different wavelengths are selectable.

7. The microscope as defined in Claim 1, further comprising: means for adjusting the phase of the pump light beam and/or the Stokes light beam.

8. The microscope as defined in Claim 1, wherein the microstructured optical element is constructed from a plurality of micro-optical structural elements that have at least two different optical densities.

9. The microscope as defined in Claim 1, wherein the microstructured optical element is made of photonic band gap material.

10. The microscope as defined in Claim 1, wherein the microstructured optical element is configured as a light-guiding fiber.

11. The microscope as defined in Claim 10, wherein the light-guiding fiber exhibits a taper.

12. The microscope as defined in Claim 1, wherein the microscope encompasses a scanning device.

13. The microscope as defined in Claim 12, wherein the detector operates in descan configuration.

14. The microscope as defined in Claim 12, wherein the detector operates in non-descan configuration.

15. The microscope as defined in Claim 1, wherein the detector encompasses a multi-band detector or a spectrometer.

16. A method for CARS microscopy comprising the steps of:
    - generating a pump light beam and a Stokes light beam extending coaxially with the pump light beam using means for generating a pump light beam and a Stokes light beam, the means for generating the pump light beam and the Stokes light beam encompassing a laser and a

microstructured optical element that spectrally broadens the light of the laser;

- directing the pump light beam and the Stokes light beam onto a sample; and
- detecting the detection light proceeding from the sample, using a detector.

17. The method as defined in Claim 16, comprising the further steps of:
    - selecting a pump light beam out of the spectrally broadened light and/or
    - selecting a Stokes light beam out of the spectrally broadened light.

18. The method as defined in Claim 16, comprising the further step of:
    - acquiring a resonance spectrum.

19. The method as defined in Claim 16, comprising the further step of:
    - identifying a wavelength combination of pump light beam and Stokes light beam at which a resonance maximum exists.

20. The method as defined in Claim 19, wherein the sample contains several different substances; and a resonance maximum is identified for at least two substances.

21. The method as defined in Claim 20, wherein the detection light has several wavelengths that are simultaneously detected separately from one another.

22. The method as defined in Claim 16, wherein the microstructured optical element is constructed from a plurality of micro-optical structural elements that have at least two different optical densities.

23. The method as defined in Claim 16, wherein the microstructured optical element is made of photonic band gap material.

24. The method as defined in Claim 16, wherein the microstructured optical element is configured as a light-guiding fiber.

25. The method as defined in Claim 24, wherein the light-guiding fiber exhibits a taper.